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INDEX

SCIENCE NEWS LETTER

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THE WEEKLY SUMMARY OF CURRENT SCIENCE • JUNE 28, 1947



Safety Lights

See Page 402

A SCIENCE SERVICE PUBLICATION

AERONAUTICS

Lighting for Safe Flying

The Navy is experimenting with light to improve night vision for pilots and prevent illusions that cause crashes. Both outside and inside lighting being tested.

See Front Cover

► SAFER NIGHT flying may result from lighting experiments on three planes at the Navy's Aero Medical Equipment Laboratory in Philadelphia.

Inside and outside lighting of planes are under experiment to overcome some of the hazards of night flying. The outside plane lighting is designed to keep pilots from becoming confused by ground lights, stars and other planes. Inside the planes, experimental lighting is being tested to help the pilot retain his visual night adaptation.

Main job of the outside lighting is to warn pilots of another plane and indicate the direction the plane is flying. One student pilot cracked up when he mistook the dim headlights of a truck on the ground for another plane. Other pilots have been confused by stars.

A three-quarter stern view shown on the cover of this SCIENCE NEWS LETTER is of an experimentally lighted plane with illuminated lucite outlining the tail and wing tip, showing how the plane would appear to a pilot flying in close formation.

Experimental lighting tested at this laboratory has included the flashing lights used by commercial planes. Another outside lighting for planes in the experiments uses illuminated plastic bars

on the wing tips, trailing edges of the vertical rudder and the horizontal elevator of the tail. A third system uses direct illumination of some sections of the plane.

One problem faced in the study is autokinetic illusion. This causes a person looking at a single, fixed point of light in the dark to think the light is moving. This illusion has caused plane crashes. A row of lights on a plane or a bar of illuminated plastic can overcome this illusion, the tests have found.

Rows of lights and direct lighting of sections of the plane will also give easily identified light which indicates the direction of flight. Other tests have shown the flashing lights of commercial planes to be effective for night flying.

Lighting experiments inside planes have used red and ultraviolet lighting for panel boards to overcome "night blindness." "Night blindness" is caused when a pilot, who has accustomed his eyes to the darkness outside, looks at a bright light inside the plane. He is unable to see as well immediately afterward when he looks out into the darkness again.

Three planes at this Navy laboratory have been equipped with experimental lighting installations for the lighting tests. The study is under the direction of Capt. John R. Poppen.

Science News Letter, June 28, 1947

MEDICINE

Surface Infection Drug

► A "LITTLE brother" to penicillin, capable of replacing that drug against surface infections and with some advantages over it, has been developed and tested, though it is not yet ready for wide use in treatment and research.

The new antibiotic, a modified form of gramicidin, has been used successfully in the laboratory at the University of California Medical School to control bacteria which invade body surfaces.

Of greatest importance is the fact that gramicidin apparently does not cause sensitization, that is, severe systemic re-

actions after repeated use. This means gramicidin can be used repeatedly in surface infections without destroying its efficiency.

For this reason it will be complementary to penicillin, which does cause sensitization. Many doctors have criticized the use of penicillin in minor infections on the grounds that sensitization will prevent its later use in major ailments.

With gramicidin as a potent weapon against body surface infections, penicillin could be reserved for occasions when it may save a life.

Results with gramicidin were reported by Dr. Hamilton H. Anderson, professor of pharmacology in the University of California Medical School. The gramicidin derivative used was developed by the Western Regional Research Laboratory, U. S. Department of Agriculture, Albany, Calif., and tested by Drs. Sam C. Wong and Y. C. Chin, associates of Dr. Hamilton.

Gramicidin, in its original form, was too toxic for use, in that it destroyed red blood corpuscles. Another handicap was the difficulty of dissolving it in water.

Wetting agents were used in combination with gramicidin and subtilin, another antibiotic useful in killing body surface bacteria. These agents distribute the antibiotic uniformly over tissues and disperse the organisms which might tend to clump and be unavailable to the drug.

Dr. Anderson said that detailed pharmacologic studies are necessary before gramicidin and subtilin can be widely used in research and treatment. He also described experiments in which subtilin killed tuberculosis germs in the test tube.

Science News Letter, June 28, 1947

AGRICULTURE

Better Silage Made From Wilted Plants

► DID YOU EVER eat the old-fashioned salad known as wilted lettuce? To one who has never experienced it, the name sounds pretty awful; but the dish has its devotees.

A cow-barn analogue now seems to have been developed by two scientists of the U. S. Department of Agriculture, T. E. Woodward and J. B. Shepherd. They have found that if the grasses, legumes and other plants that are to go into the silo are first wilted until their moisture content stands between 58% and 68% and then cut very fine, the resulting silage will be more nutritious and better relished by the cows. If the weather is too damp for the wilting process when the silo is being filled, addition of from 5% to 15% of dry hay will turn the trick.

A big saving in both cash and labor is effected by the pre-wilting process. For many years it has been orthodox practice to add acid to the silage, either directly or by the addition of molasses or the like, which produced acid by fermentation. With the wilting method, this acidification has been found unnecessary.

Science News Letter, June 28, 1947

CHEMISTRY

Artificial Protein Fibers

Synthetic meat better than beefsteak and fabrics silkier than silk may result from this major advance in organic chemistry.

► THE ARTIFICIAL manufacture of protein fibers announced at Harvard promises:

Synthetic meat better than beefsteak.

Chemical germ fighters better than penicillin and streptomycin.

New factory-made textiles silkier than silk.

And a new approach toward building artificially the chemical structures which are the basis of life.

This is what Dr. Robert B. Woodward, Harvard's 30-year old chemist, did:

He linked together by the thousands the simple nitrogen-containing structures (amino acid anhydride molecules.) He made the first successful synthesis of fibrous protein molecules as complex as those in the living human body or other living structures. He induced protein molecules to polymerize (join one to another in long chains) in much the same way that hydrocarbon molecules polymerize to form synthetic rubber.

Artificial Antibiotics

Already artificial compounds like some of the germ-killing substances produced by soil bacteria have been made in the Harvard laboratories. The new artificial antibiotics are promising in chemical structure and similar to the natural gramicidin, tyrocidin and bacitracin germ-killers. But they are too recently made to be tested yet in actual germ-fighting.

Giant protein molecules in thick and viscous solution have been squirted through a hypodermic needle into the air to make a silk thread, the way a spider does it. Thin films of the new plastic have been made—first of a new protein family of plastics that may become as well known as rayon, nylon and cellulose sheeting.

Dr. Woodward found that previous experimenters were on the wrong track when they expected protein molecules to link up by losing water. Loss of carbon dioxide allows the linkage in the newly-discovered process.

In the description published in the Journal of the American Chemical Society (June), Dr. Woodward and his associate, Dr. C. H. Schramm, tell in

formulae their method of growing the fairly simple amino acid anhydrides into complex polymers in the chemical solvent, benzene, with a very small amount of water to start the reaction. Throwing off carbon dioxide, the molecules join in long chains that can weigh a million times the hydrogen atom—a size that has never before been achieved in artificially made protein.

The door has been opened by these researches to the study of complex protein products basic to life itself. A new chemical view of blood, meat, milk, hair, fingernails, and thousands of other things in the animal body is now possible. The new synthesis may bring us closer to synthesis of protein or meat-like food from inorganic or non-agricultural materials.

Dr. Woodward worked out a synthesis

of quinine in 1944, but this chemical manufacture of the anti-malarial chemical was too complex to be practical. However, his new fibrous protein synthesis appears to be capable of development with important possibilities in biology, medicine, plastics and technology.

Science News Letter, June 28, 1947

BACTERIOLOGY

Small Germ Discovered; Named After Big Texas

► TEXAS has received a new distinction which even the most zealous of Texans may not appreciate. The Lone Star State has had a germ named after it: *Salmonella texas*. It is very small germ, at that.

The new species was isolated by U. S. Public Health Service workers from the digestive tract of a four-year-old boy in Hidalgo county, whose mother said he had been having abdominal pains and diarrhea for about a week. It is described in *Public Health Reports* (May 30) by Dr. James Watt, surgeon, and Misses Thelma M. DeCapito and Alice B. Moran, bacteriologists.

Science News Letter, June 28, 1947



PROTEIN MAKER—Robert B. Woodward, associate professor of chemistry at Harvard University, discovered the synthetic protein analogy. He is holding a model showing the structure of molecules common to proteins such as hair, muscle, silk and fur and his new synthetic substances. The balls marked "X" and "Y" show the elements which are not the same in every protein and cause the difference in their properties.

MEDICINE

Radar for Healing Sick

Waves can be used for heating living tissues and may be superior to the methods now used. It can be beamed and localized like spotlight.

► RADAR, famous for its use in military aviation, is now going to be used to heal the sick. Experiments showing its potential value in medicine are reported by Drs. Frank H. Krusen, J. F. Herrick, Ursula Leden and Khalil G. Wakim, of the Mayo Foundation in Rochester, Minn.

It will be used to heat living tissues in conditions where that is desirable. Shortwave diathermy is now used for this purpose. Radar will be better for this purpose for a number of reasons, the Mayo scientists believe.

Radar can be beamed and localized like a spotlight, which will make its medical use easier. The patient will be free to move away from the radar director at any time. Freedom from pads, encumbering cables and toweling commonly used with shortwave diathermy will permit more rapid cooling of the skin, which constitutes another advantage of radar.

The medical use of radar was under investigation years before the war. It had not then been given its name, radar, but was known as microwave therapy or microkymatotherapy. Starting in 1937, Dr. Krusen and associates were in correspondence with various physicists about the then newly discovered electromagnetic waves that could be focussed and made to travel along tubes. By March of 1939 they had learned of the Klystron tube and, as Dr. Krusen relates, thought that at last they had tracked down a tube of large enough wattage to provide radiation of sufficient power for medical use.

"But suddenly all such tubes became mysteriously unavailable. We could never obtain a Klystron or a magnetron tube. We were greatly puzzled during the years that followed and during the early part of the war concerning our inability to obtain a microwave tube just when tubes of sufficient power were becoming available.

"It was not until the secret of radar was finally revealed that we realized that all such tubes had been frozen for military use and were being employed for this secret wartime development."

Details of the studies preliminary to medical application of radar are reported in the proceedings of the Staff Meetings of the Mayo Clinic (May 28).

Science News Letter, June 28, 1947

ENGINEERING

Ore Separation Process Uses Centrifugal Force

► INDUSTRIAL operations that depend on separating light particles from heavy ones, such as ore flotation and coal sorting, are now offered the benefits of centrifugal force, long familiar in the cream separator. A machine embodying this principle, invented by H. L. McNeill of Denver, has been covered by U. S. patent 2,422,203.

The mixture of light and heavy particles, as it comes from the grinding mill, plus water and whatever pulp is used to facilitate separation, is discharged into a conical or cylindrical chamber, within which a correspondingly-shaped rotor is spinning. Light and heavy particles, thrown outward from the rotor, form two zones, the lighter within and the heavier without. Heavy particles settle to the bottom and drop out through a central opening; light ones float to the top and find there an appropriate discharge spout.

Science News Letter, June 28, 1947

CHEMISTRY

Blame Soap Molecule If Shaving Cream Hardens

► BLAME THE SOAP molecule if your shaving cream hardens in the tube or your cosmetics turn to a rubbery jelly.

That is the verdict of chemists, reported to the American Chemical Society's National Colloid Symposium held at Stanford University.

The soap molecule is the villain to blame for deterioration of greases or ointments, Todd M. Doscher and Robert D. Vold of the University of Southern California explained.

Shaped like a pencil, the soap molecule has one end which is soluble in oil, while

the other end is soluble in water. Lubricating grease, ointments and such products as shaving cream and cosmetics are mixtures of these pencil-shaped soap molecules with water and oil.

If there is too little water, then the soap molecules form a tight network which forces out the oil. If there is too much water, the oil and water form an emulsion which will ruin a lubricant.

The remedy, the chemists explained, is correct proportions of soap, oil and water. Creams, greases and ointments have been made by rule-of-thumb methods, they charged. Like cook-book recipes, the formulas do not always work.

More scientific study by chemists may solve some of the problems.

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BALLISTICS

U. S. Research on Rocket

Scientists are developing a better missile than the V-2. Smaller rockets are being tested to give data. Guiding missile is big problem.

► THE GREAT American rocket, a "made in the U. S." missile superior to the famous German V-2, is being developed step-by-step by the U. S. Army.

The rocket is not yet under construction. It is not even completed on the drawing board. Plans for the rocket will come from a mass of scientific data and observations collected from perhaps thousands of rocket firings with other missiles.

Stepping stones toward America's postwar answer to the V-2 are the smaller missiles being built and tested by the Army. These incorporate new designs and specialized parts. If some of these innovations stand up under tests they may be incorporated into future rockets.

More experiments aimed at the development of the all-American rocket are being conducted with V-2's fired at White Sands, N. Mex.

Army rocket experts are not talking about the end-product of these experiments. One guess is that an American super-V-2 may be unveiled within a year from now. If it is ready by next spring, the new rocket will have to be tested at a new shooting ground.

The V-2 firing site at White Sands, with a 90-mile range, is even a bit small for the V-2, as the Army found out a few weeks ago when a Nazi missile strayed into Mexico. This means that a new and untested rocket, as large or larger than the V-2, will probably not make its debut on the famous sands near El Paso.

One of the biggest problems in building a better rocket than the V-2 is in the gyroscope, which steers the missile. The Germans had trouble making the rocket go where they wanted it to. The V-2 that landed in Mexico also revealed the difficulty in keeping the weapon under control once it is fired.

An American-built device for tilting the gyroscope in flight is the first step toward control of the rocket by radio from the ground, the dream of all missiles designers.

Another step ahead of the V-2 has been achieved by the Army. This is a simplified fuel piping system, planned

to do the job of the complicated mass of pipes on the Nazi rocket.

Newest of the smaller missiles being tested by the Army are the WAC-B and the Corporal E.

The WAC-B is a new version of the WAC Corporal rocket, built in this country during World War II. A feature of the new rocket is a light-weight sheet steel motor construction, compared with the forgings and castings of other rockets.

Less is known of the Corporal E, which is reported to have been fired successfully at White Sands. The Army just isn't talking about this one yet, but it is believed to be another of the small experimental rockets which will help develop the great American rocket.

Science News Letter, June 28, 1947

ASTRONOMY

New Comet Discovered Near Sagittarius and Libra

► A NEW COMET, barely visible through a five-inch telescope, has been discovered in the southern evening sky by a Russian observer and reported to the Harvard College Observatory.

The comet has been named Jakovin Junior, after its discoverer. It was first spotted near the constellations Sagittarius, the archer, and Libra, the scales. The comet was north of the star, Antares, in

the constellation Scorpius, the scorpion. The new comet was reported moving northward.

Science News Letter, June 28, 1947

ENGINEERING

Char from Coal Suitable For Powder Burner Use

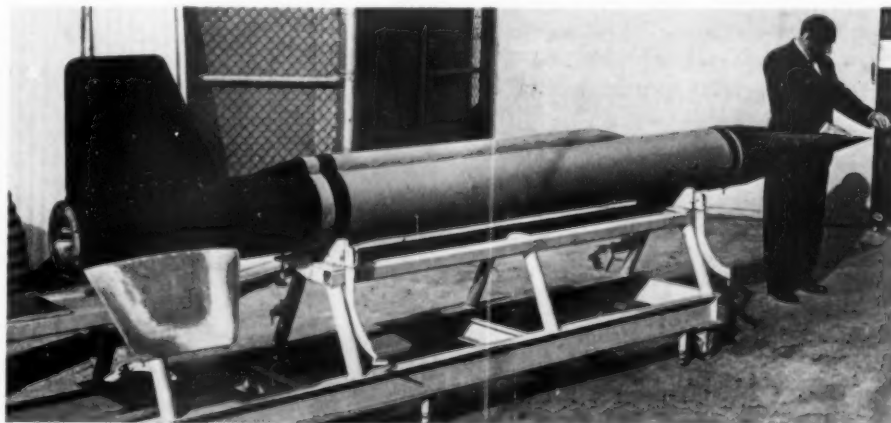
► A PRODUCT of coal called char can be pulverized finer than raw coal and is therefore suitable for fuel in powdered fuel burner installations, the American Society of Mechanical Engineers was told by A. D. Singh of Chicago and L. J. Kane of the U. S. Bureau of Mines.

Both these men were formerly associated with the Institute of Gas Technology in Chicago, and reported on work done at the institution. Char is made from coal by driving off part of the volatile contents in the form of gases and vapor. It is not a new product but relatively new processes now make it obtainable at reasonable cost. Processes were described.

A method of pulverizing coal, char and other solids, developed at the Institute of Gas Technology, was also described. It is known as flash pulverization. In it, powdered char, mixed with hot combustion gases, escapes from a compression chamber through a nozzle, and explodes with the removal of pressure into very fine particles.

Advantages of powdered char over raw coal include its higher rates of combustion with a considerably shorter flame, resulting in increased furnace capacity. Saving of four to five percent in fuel can be effected because of its lower hydrogen content and reduced surface moisture.

Science News Letter, June 28, 1947



WAC-B—American built, this rocket is a predecessor of the superior missile to be developed.

AERONAUTICS

Preventing Plane Crashes

Pilot errors of unavoidable misjudgment cause majority of crashes. Instruments can take out some of the guesswork.

► **PILOT ERRORS**, the cause of the majority of the major airplane crashes in the past year, might be responsible for fewer accidents if all commercial transports were equipped with more of the automatic controls recently developed to aid the human being at the controls.

Pilot errors are not due to carelessness but to what might be called a type of misjudgment. Trained pilots seldom knowingly take chances. Headwinds and tailwinds can cause them to misjudge onward speed. Hazy atmosphere may create optical illusions. Radio static can prevent good radio reception.

Even a radar scope requires a moment to interpret and another moment for the pilot to act. This may be too long a delay in a fast-moving plane.

Other Causes

Not all airplane crashes in the past year were due to pilot errors. The U. S. Civil Aeronautics Administration states that they were the cause of the majority, however. Other causes include structural defects, engine trouble and fires. But even these might have been harmless if the planes were equipped with automatic devices which would have given the pilot early warning.

Many instruments to make flying safer have been developed during the war and following years. Most of them are still in an experimental stage. Their use, however, need not await perfection. Their installation is costly. Their use might cut down pay-load capacity and even require extra crew members. But human life is at stake.

If airplane companies cannot finance the installations the government perhaps should aid them.

A great forward step has already been taken by the government in the installation of very high frequency (VHF) radio equipment at airports under the control of the Civil Aeronautics Administration. This is static-free. The CAA also is converting its radio ranges, the so-called radio beams on which commercial transports fly, to a very high frequency type. It gives a reliable beam in all types of weather. When a plane

follows the beam, it is relatively safe from collisions with stationary objects such as mountains.

Radar, hailed during the war as the cure-all for civilian flying in postwar days, has as yet not been widely installed in transports. The war-type equipment was thought too heavy, too bulky and to require too many extra members of the crew to operate. However, lightweight radar equipment has now been developed. The Army announced a 125-pound set about nine months ago.

Howard Hughes, of aircraft fame, has recently produced what he calls a radar-altimeter that flashes a light and sounds a horn when a plane comes within 2,000 feet of an obstacle.

Automatic electronic pilots give great promise of increasing safety in planes. They will hold a plane on the radio beam in cross-country flights and on the glider beam in landing. They respond to the waves in the beam. A human pilot is still necessary, but his job is to watch the equipment and see that it is working properly.

Automatic controls are said to handle engines, flight, navigation and even traffic control better than humans and with-

out fatigue or error. They are not subject to the "panel panic" that sometimes overwhelms the human pilot in a crisis. This is due to the bewildering array of indicators and gages, switches and levers on the present panel board. These autopilots make flight control easier, assist direction control, trim, altitude selection, constant speed and even bad weather landings.

A few other instruments of improved types are needed. A pilot needs to know wind direction and velocity. He needs to know outside temperature. At high altitudes, ice may form on propellers or wings. Electricity in the atmosphere may interfere with electric equipment in the plane. De-icers and static dischargers are important.

Then a plane should be equipped with automatic devices that warn a pilot of imperfect engine functioning and of internal vibrations that might result in structural failure.

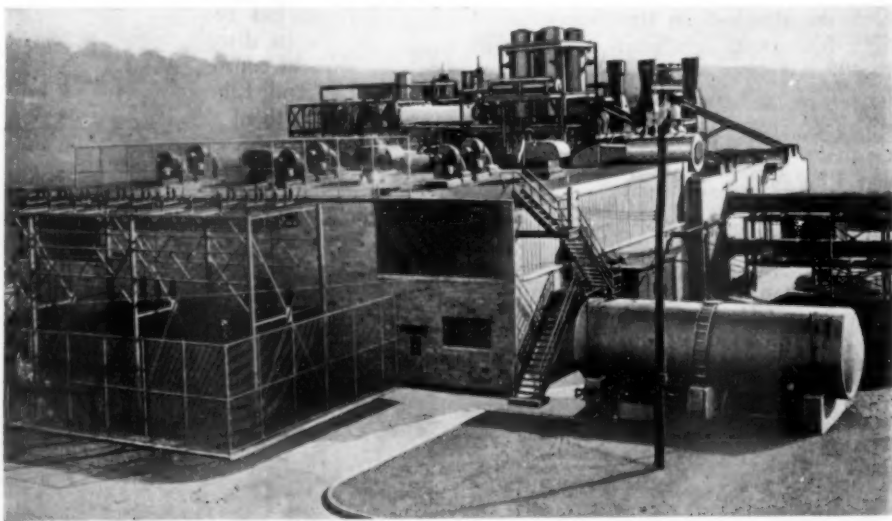
Science News Letter, June 28, 1947

INVENTION

Air Conditioning Cleaner

► **AN AIR-CONDITIONER** for railway passenger cars that incorporates an electrical air-cleaner is the invention on which E. H. R. Pegg of Cranford, N. J., has received patent 2,422,563. A series of electrically charged plates attracts and holds dust from outside air, and even tobacco-smoke particles from the car itself. They are subsequently washed off and discarded. Patent rights are assigned to Westinghouse Electric Corporation.

Science News Letter, June 28, 1947



TURBINE TESTING—This equipment in the new gas turbine development laboratory, to be used for Army Air Forces engine research, can absorb and measure as much as 20,000 horsepower.

ASTRONOMY

Summer Constellations

The earth's movement to bring the sun in line with Gemini, the twins, brings Scorpion to July evening skies. High in east are prominent constellations.

By JAMES STOKLEY

▶THE MOST familiar movement that we see in the sky is doubtless the daily motion of the sun as it rises in the east, climbs to the meridian during morning hours, then in the afternoon sets to the west. This movement is not, as men once thought, one of the sun itself. It is the earth that turns every day from west to east, carrying us upon it. But since we feel no vibration or other such evidence of this, it looks as if the sky goes around us once a day in the opposite direction. This not only makes the sun move, but the stars, together with the moon and planets when they are visible, also partake of it. The accompanying maps show the heavens as they appear about 10:00 p. m. by your local variety of standard time at the first of the month. But if you are up at midnight you will find constellations have shifted. Those shown low in the west will have disappeared behind the horizon; others, not shown, will have come into view in the east.

Moving Around Sun

In addition to its daily turning on its axis, the earth is also moving around the sun, once every year. On this account the sun at different times of year stands against a different starry background. This month it is in the same direction as the stars of Gemini, the twins, and so they cannot be seen in the solar glare. However, by next New Year's day, when the earth has gone around a half of its orbit, Gemini will be visible again, while the sun will be toward the stars of Sagittarius, the archer, a group indicated on the July maps to the southeast. That is why Sagittarius and its neighbors are typical constellations of the summer evening.

Even more characteristic is Scorpion, directly south, a figure representing a scorpion, with the long curving tail. Higher, in the body, is Antares, a star of the first magnitude with a distinctly red hue. Next to Scorpion, toward the west, we see Libra, the scales, which this month is made more prominent by the presence

of Jupiter, the only planet easily seen at present. Of magnitude greater than any of the stars now seen, one has little trouble in locating it, even without maps. And next to Libra, farther west, is Virgo, the virgin, with Spica, another star of magnitude one.

Constellations in East

High in the east shines a group of prominent constellations, of which Cygnus, the swan, is one. It has the shape of a cross on its side, with Deneb at the top, which is toward the north. Above is a smaller configuration, Lyra, the lyre, with Vega, most brilliant of the stars seen these evenings. Lower than Cygnus, and to the south, Aquila, the eagle, flies. In it is Altair, with a fainter star just below and another about as far above.

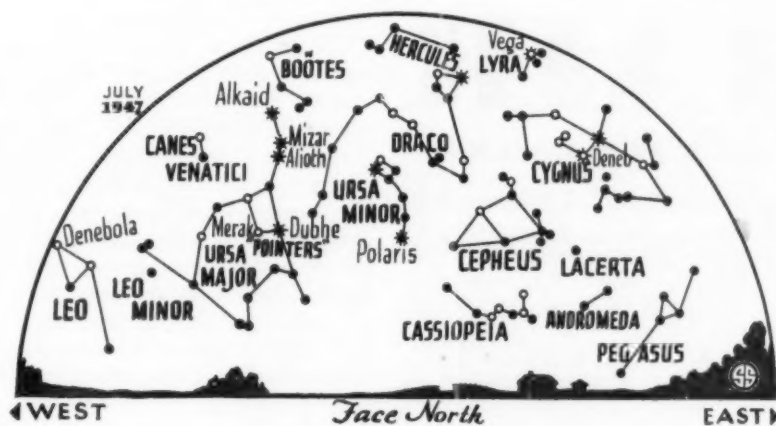
Toward the north the Great Dipper, part of Ursa Major, the great bear, is climbing ever higher, with Merak and Dubhe, the two "pointers" indicating the pole star directly north. Polaris, to use its proper name, is at the end of the handle of the little dipper, which extends upwards. Around it winds the snaky constellation of Draco, the dragon.

If you look low in the west just after sunset you may be able to see the planet Saturn, but it sets soon after the sun. Mars, still quite far away and not very bright, is now in Taurus, the bull, and rises in the east in the early morning. Venus is in Gemini, the same constella-

tion that now holds the sun, so it is difficult to locate. However, it is extremely bright, and perhaps may be glimpsed low in the east at dawn. Mercury is closer to the sun and not visible now, though at the end of July it will be coming into the morning sky.

It is the big constellations—or those containing the brightest stars—to which deservedly we give the most attention. However, there are many smaller ones in the sky, often forgotten, which have interesting stories. For instance, nearly overhead is Corona, otherwise called Corona Borealis, the northern crown. The brightest star, of the second magnitude, is placed in a semi-circle of fainter stars making it easy to locate. According to the mythological stories associated with the heavens, this represents the crown that Bacchus gave to Ariadne, daughter of Minos, second King of Crete. Legend tells us that Theseus, king of Athens about 1200 B. C., was shut up in the Cretan labyrinth, where lived the fierce Minotaur, a monster with the head of a bull who had the unpleasant habit of feeding upon chosen young Athenian men and women sent yearly as tribute to Minos. Theseus slew the beast, and found his way out of the labyrinth with a thread that the lovely Ariadne had given him. Though he married her, the ungrateful king later deserted her. Finally, according to the story as Plutarch tells it, Bacchus became espoused to her and gave her the crown which was placed in the sky after her death.

In the east, just above Altair, three stars are shown marking Sagitta, the arrow. One story associates this inconspicuous figure with the larger group of Her-



Do You Know?

Snowflakes, caught in the air in a quickly drying plastic solution, are preserved for scientists studying snow-crystal forms.

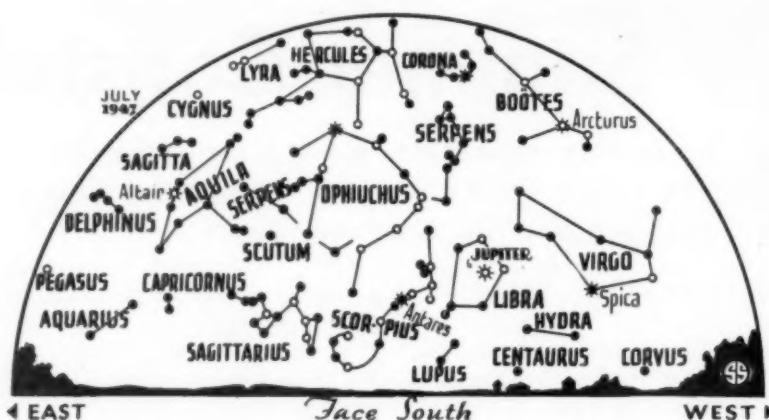
American *steel* industry depends largely on iron ore from the Mesabi region in Minnesota; this high-grade ore, used to produce about 85% of the steel made, is shipped by water from western Lake Superior to Lake Erie ports.

Calcium cyanamide, which is made in one process of fixing atmospheric nitrogen to manufacture fertilizer and explosives, was produced in Germany at low cost by a continuous rotary furnace process.

When tomatoes are raised to make *catsup*, high acid content is desirable to give sprightly flavor; potash applied as a fertilizer to the growing crop will increase the acid in the tomatoes produced.

Wartime developments in the use of *aluminum* have boosted it into a position of the second-rating metal of peacetime industry in terms of volume produced; iron, including steel, is number one.

Among American common *vegetables*, cabbage, carrots, beets, peas, cucumbers and cantaloupes are of Old World origin; potatoes, tomatoes, green peppers, pumpkins, and most squashes and beans were originally New World products.



◀ EAST Face South WEST ▶
* * * * SYMBOLS FOR STARS IN ORDER OF BRIGHTNESS

cules, just west of Lyra. Hercules, you will recall, performed twelve classic labors, of which the fifth was to kill the birds of Lake Stymphalis. Aquila is sometimes considered to represent one of these birds, and Sagitta is the arrow he used, still shown in flight towards its prey. However, it has also been made the arrow of Cupid!

On the opposite side of Aquila, just above Sagittarius, one star is shown marking the shield, Scutum. This is a relatively modern constellation, having first been shown on the star maps published in 1690 by the Polish brewer and amateur astronomer, Johannes Hevelius. He called it "Sobieski's Shield," to honor the third John Sobieski, king of Poland. A distinguished soldier, he commanded the troops who freed Vienna from the Turks in 1683, so it is not surprising that the loyal Hevelius seven years later honored him with a constellation to fill a part of the sky which up to then had been empty.

Another of Hevelius' constellations is

that of Canes Venatici, the hunting dogs, in the curve formed by the handle of the Great Dipper. Also to him we must give credit for Lacerta, the lizard, now seen in the northeast, and represented on the maps by a single star; Leo Minor, in the northwest, and several others not shown.

* * *

Celestial Time Table For July

July	EST	
3	5:38 a. m.	Full moon
	10:00 p. m.	Moon farthest, 252,500 miles
5	5:00 a. m.	Earth farthest from sun, 94,451,000 miles
11	5:54 a. m.	Moon in last quarter
14	1:00 p. m.	Mercury passes sun
	11:56 p. m.	Moon passes Mars
17	12:40 a. m.	Moon passes Venus
	6:00 p. m.	Moon nearest, 222,000 miles
	11:15 p. m.	New moon
18	9:50 p. m.	Moon passes Saturn
22	4:00 a. m.	Mercury passes Venus
24	5:54 p. m.	Moon in first quarter
26	1:41 a. m.	Moon passes close to Jupiter
28	early a. m.	Meteors of delta Aquarid shower visible
31	1:00 a. m.	Moon farthest again, 252,400 miles

Subtract one hour for CST, two hours for MST, and three for PST.
Add one hour for the corresponding Daylight Saving Time.

Science News Letter, June 28, 1947

YOUR HAIR AND ITS CARE

By O. L. Levin, M. D. and H. T. Behrman, M. D.

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BIOLOGY

Diatoms Collect Copper

➤ COPPER is collected by one-celled sea plants known as diatoms in concentrations that are scores of times strong enough to kill them—in theory at least.

Analysis of these microscopic vegetable junkmen made by an English scientist, N. Ingram Hendey of the Admiralty Central Metallurgical Laboratory, shows that several different species contain anywhere from 31 to 164 parts per million of copper by weight. By way of contrast, Mr. Hendey mentions that one-half part of copper per million is considered to kill the plants' freshwater relatives that sometimes make trouble in

city water systems. The sea water in which the specimens were collected for analysis contained only seven parts per billion of copper.

What these micro-plants do with their copper collections has not yet been determined. Mr. Hendey suggests that it may either be chemically shelved as a precipitate or coagulate, or that it may have some functional role in the plant-cells' pigment bodies.

In his communication to *Nature*, (May 10), Mr. Hendey does not mention a possible connection between this copper-

collecting activity of diatoms and the high copper concentration in oysters, which feed largely on diatoms. It has been known for some years, for example, that oysters in the infant phase of their lives will not settle down and start growing shells unless there is a trace of copper in the water over their beds.

Dr. Paul Galtsoff, of the U. S. Fish and Wildlife Service's fisheries laboratory, expressed lively interest in a possible connection between copper in diatoms and copper in oysters. Oysters, he said, have a tolerance for copper far beyond their known physiological requirement for the metal. Some of the laboratory tanks with which he works have copper or brass fittings, and the oysters in them absorb so much copper directly from the water that they turn green. He added that oysters often have far greater quantities of zinc than of copper in their bodies, but nobody has yet found out what they do with it.

Science News Letter, June 28, 1947

PLANT PATHOLOGY

Blight-Resistant Potato Is New Variety Produced

► BLIGHT-RESISTANT potatoes, able to defy the fungus disease that ruins millions of bushels yearly and that a century ago caused famine in Ireland, seem at last to be realized. Dr. D. K. Reddick, Cornell University plant pathologist, has produced several new varieties by crossing cultivated potatoes with a wild species from South America.

In 1927, after ten years of vain search for an immune variety, Dr. Reddick broadcast an appeal through the press. A farmer in northern New York, Fred Ashworth, responded with this South American species, which he had imported in an effort to get a frost-proof potato and had found to be blight-proof instead.

Dr. Reddick found the South American potato worthless as a crop plant, but was able to hybridize it with good cultivated varieties in such a way as to produce a number of varieties that are expected to prove profitable as well as immune to the blight.

One of the new varieties he has named Ashworth, in honor of the man who gave him the South American parent strain. Others are called Chenango, Empire, Essex, Fillmore, Hartford, Madison and Snodgrass. Test lots of the new varieties are now being tried out at a number of experiment stations, including one in Costa Rica.

Science News Letter, June 28, 1947

CHEMISTRY

Rubber Fibrils Squeeze Out Drops When Stretched

► RUBBER DEPENDS for its elasticity on its ability to squeeze liquid droplets out of its micro-fibrillar structure when stretched. Other elastic substances have the same micro-structure, with minute fibers enmeshing a liquid.

This was one of the findings laid before members of the American Chemical Society in Palo Alto, Calif., by Prof. E. A. Hauser of the Massachusetts Institute of Technology and Dr. D. S. le Beau of the Midwest Rubber Reclaiming Company. In their research they used an ultramicroscope, which is a quartz-lensed instrument using short-wave ultraviolet instead of visible light. It does not give as high magnification as the electron microscope but on the other hand spares the specimen the destructive bombardment of the electron stream.

The same soap or other detergent that takes grease and dirt out of fabrics can help get otherwise insoluble dyes into them, Prof. James W. McBain of Stanford University reported to the American Chemical Society. Less than one per cent of a "solubilizing" detergent will help the dye to take hold. A similar phenomenon has been observed in nature, he pointed out, in the transportation of the insoluble vitamins A and K in the body fluids.

Associated with Prof. McBain in this study were A. G. Wilder and R. C. Merrill, Jr.

Science News Letter, June 28, 1947

ENGINEERING

Stream Pollution Costly Even If Waste Is Used

► INDUSTRIAL wastes or sewage which pollute a stream are costly, even when useful by-products such as fertilizer are recovered, Prof. George E. Barnes of the Case School of Applied Science told the American Society of Mechanical Engineers meeting.

More and more, industry can expect to have to bear some of the costs of this national problem, Prof. Barnes warned.

Polluting streams with wastes from industry runs up a bill of millions of dollars each year, he explained. The old idea, made famous by the French author, Victor Hugo, in his classic "Les Misérables," that recovering wastes such as sewage by chemical treatment can

produce by-products to foot the bill is not true, Prof. Barnes declared.

The income from by-products of sewage and other industrial wastes will reduce the costs of stream pollution, but it will not pay the whole cost.

Stream pollution, the speaker explained, creates "indigestion or disease" of a river. The cure is expensive. Sewage must be treated. Sewage-borne solids must be removed or treated. When sludge, scum, grit or screenings are removed from the polluted stream, there is still the problem of disposing of this waste.

While there are standard treatments for sewage pollution of streams, Prof. Barnes said that industrial wastes sometimes create unusual problems. Such wastes from industry as oil, acids, cyanides or metals require special treatments.

In one state, Pennsylvania, alone, the estimated needs in industrial waste treatment plants have been estimated at \$35,000,000.

The trend is toward industries directly bearing at least part of the cost of stream pollution, Prof. Barnes stated.

Science News Letter, June 28, 1947



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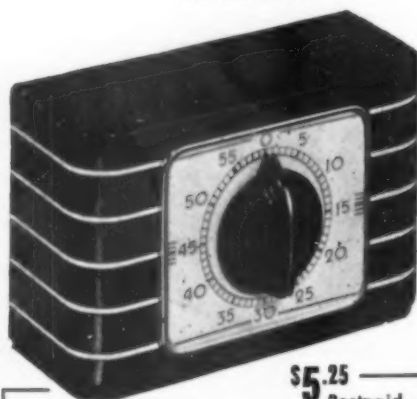
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into them—all these, and much besides, crowd the 944 pages.

This is the first Yearbook the Department of Agriculture has issued since the beginning of World War II. Even the "skimmest" kind of examination produces a most astonishing catalog of new things under the farmer's sun. Just at random: DDT, benzene hexachloride, 2,4-D, hybrid vigor in cattle, poultry and other animals, application of the hybrid idea to a range of plants from alfalfa to onions, feeding hormones and vitamins to animals, insect repellents, penicillin and other antibiotics in veterinary medicine—the list might be continued almost indefinitely.

Sometimes two scientific techniques are combined in one job. For example, a promising wheat hybrid proved sterile because its chromosome number was wrong. So the geneticists used colchicine to get offspring with double the chromosome number, and these proved perfectly fertile.

Department of Agriculture researchers know well that man does not live by bread alone. Along with their new strains of corn and wheat they have been breeding bigger and better berries and fruits and even doubling the size of Easter lilies.

Science News Letter, June 28, 1947

NUTRITION

Disease Can Starve Babies As Well as Lack of Food

➤ **PICTURES** of starving babies, pathetic little bundles of skin and bones with big, tragic eyes, stopped many a doctor strolling through the exhibits at the recent American Medical Association meeting. Some of the babies pictured were European war and famine victims. Others were American babies brought to hospitals in the Boston and Cleveland areas for treatment for malnutrition. Without the labels under the pictures, you could not have told which was from Europe and which from the United States.

The American babies were not starving from lack of food. Their parents could and did provide plenty of the right kind of infant fare, with vitamins, proteins, carbohydrates and minerals, that ordinarily causes youngsters to thrive and grow.

These babies were sick babies. They were starving because disease, usually a chronic infection, kept them from being nourished by their food. Their pictures were shown by Dr. Charles F. McKhann and Dr. Samuel Spector, Western Re-

serve University School of Medicine, to call the attention of other doctors to the fact that malnutrition is not always the result of poor or scanty diet.

Only one out of 10 of the more than 1,000 malnourished infants they studied were starving because of lack of the right kind of food. About one in 10 failed to gain weight because of some psychological or emotional disturbance or refusal to eat.

The other eight out of each 10 were malnourished because of disease, often a disease not easily detected.

Dr. McKhann said the principal diseases causing loss of weight and other results of malnutrition are infections of the nose, throat, lungs and other parts of the respiratory tract, with infected adenoids, and sinuses probably causing the greatest amount of trouble. Other causes are congenital heart disease, disturbances of the metabolism, infections of the kidneys and genito-urinary infections, and coeliac syndrome.

Science News Letter, June 28, 1947

ORNITHOLOGY

Starlings Prefer Waltzes To Sousa's Martial Music

➤ **LATEST WEAPON** against those pesky birds, the starlings, is march music, but it probably will not help rid your town of starlings.

At the Philadelphia zoo, starlings built their nest in a loud speaker. They were not disturbed at all by the soft strains of waltzes. But when the stirring marches of John Philip Sousa were played, the starlings stirred. They flew off when the martial music began and returned only when it finished.

It seems the zoo's taste in music agreed with the starlings, though. They have raised four babies and are incubating a second brood.

Science News Letter, June 28, 1947

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ALASKA BECKONS—Marius Barbeau—*Casson*, 343 p., illus., \$4.50. A dramatic interpretation of the Indian lore of this north country and correlation of these peoples' history, folk lore and music with the Asiatic peoples of long ago.

AMERICAN MILITARY GOVERNMENT IN GERMANY—Harold Zink—*MacMillan*, 272 p., \$4. A careful analysis of the development of military government from temporary measures to long-range planning, the obstacles encountered and future plans.

BLOODHOUNDS AND HOW TO TRAIN THEM—Leon F. Whitney—*Orange-Judd*, 142 p., illus., \$2. A complete discussion of the training required to teach these hounds to trail man. Police procedure is particularly emphasized.

CHEMISTRY OF MUSCULAR CONTRACTION—A. Szent-Gyorgyi—*Academic Press*, 150 p., illus., \$4.50. Delivered as the Cameron Prize Lecture at the University of Edinburgh, this is a discussion of the constituents of the contractile muscle fibril and the induction of contraction *in vitro*.

THE DATES AND EDITIONS OF CURTIS' BRITISH ENTOMOLOGY—Richard E. Blackwelder—*Smithsonian*, Misc. Col. Vol. 107, No. 5, 26 p., illus., paper, 25 cents. A comparison of the original edition of this classic source for genotype designation with the revised reprint edition. In the latter some major changes were made in genotype designation and nomenclature.

FABRIC STRUCTURE—John H. Strong—*Chemical Pub.*, 241 p., illus., \$6. Completely illustrated with diagrams and photographs, this text is both a good foundation for textile students and a useful reference book. Particular emphasis is laid on the characteristics of the different threads, both natural and artificial.

HERMON CAREY BUMPUS: YANKEE NATURALIST—Hermon C. Carey, Jr.—*Univ. of Minn.*, 141 p., illus., \$2.50. This biography records the varied career of a man distinguished as biologist, museum director, and college official.

A HISTORY OF THE AMERICAN MEDICAL ASSOCIATION 1847 to 1947—Morris Fish-

bein—*Saunders*, 1226 p., illus., \$10. Commemorating the centennial of the A.M.A., this history reviews its rise as a great organization, its campaigns in behalf of medical education, to eliminate quackery, improve industrial health and provide throughout the country a high quality of medical care.

MICROBIAL ANTAGONISMS AND ANTIBIOTIC SUBSTANCES—Selman A. Waksman—*Commonwealth Fund*, rev. ed., 415 p., illus., \$4. Bringing up to date the material on streptomycin and penicillin, this basic text in antibiotics has also an enlarged bibliography.

P-Q-R-S-T—Joseph E. F. Riseman—*Macmillan*, 84 p., illus., \$3.50. A beginner's guide for use during examination and interpretation of electrocardiographic tracings.

QUALITATIVE ANALYSIS BY SPOT TESTS: Inorganic and Organic Applications—Fritz Feigl—*Elsevier*, 3rd ed. 573 p., illus., \$8. Completely up-to-date, this classic text on spot analyses is again available. A section on technique and apparatus is included as well as a survey of all literature on spot test analysis.

RADAR ENGINEERING—Donald G. Fink—*McGraw-Hill*, 644 p., illus., \$7. Designed to provide a general compilation of radar information, Part I deals with fundamental concepts of radar technology; Part II, with components, circuits and structures used in equipment.

Science News Letter, June 28, 1947

MEDICINE

"Tagged" War Gases Traced Through Body

► "HUMAN GUINEA PIG" and animal experiments in which the deposition in living tissues of the deadly war gases, mustard and lewisite, was traced with radioactive substances, have been revealed at the University of California.

The experiments were done during the war to learn more about the action of these gases. Dorothy Axelrod, research assistant, and Dr. Joseph G. Hamilton, associate professor of medical physics, reported the work in the *American Journal of Pathology* (May).

In the experiments, a tiny section of skin was painted over with mustard gas "tagged" with radioactive sulfur or lewisite "tagged" with radioactive arsenic. Thin slices of biopsied skin taken after administration were placed on a photographic plate, the radioactivity exposing the film.

From these radioautographs, Miss Axelrod and Dr. Hamilton were able to determine in what tissues and types of

cells the two gases were found to concentrate.

Lewisite was deposited in the outer layer of the skin, the hair follicles and hair. Very little penetrated to the deeper layers of skin, but it was very destructive to cells wherever it lodged.

Mustard gas proved much more penetrating, going primarily into the under layer of skin, thus possibly explaining the deep burns found in exposure to this gas.

An accumulation of both materials was found in and around blood vessels.

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❁ **JELMETER** is a simple device for home use to indicate the amount of natural pectin in fruit juices and the amount of sugar needed for jelling. A glass tube, with a small bottom outlet, is filled with the juice, which is permitted to drip for one minute. A line on the glass at the top of the remaining juice shows the amount of sugar needed.

Science News Letter, June 28, 1947

❁ **FISHLINE SINKER**, made of metal, has a removable center between two end parts; the center portion, which tapers toward its ends, can be replaced by one with a greater diameter and weight. Slotted lengthwise, it can be removed and the replacement added without tools.

Science News Letter, June 28, 1947

❁ **BEVERAGE** bottle carrier grasps six bottles by their necks and has a centered handle for carrying. The device is made of plastic with six openings to slide over the bottle necks and two hinged clamps to hold them tightly in place.

Science News Letter, June 28, 1947

❁ **VENTILATED** umbrella for use on the lawn is made of overlapping strips of light aluminum that keep out the sun, but allow air-circulation. The picture shows its sturdy construction and that it



can be tilted as needed. The umbrella is made in eight sections to permit easy dismantling and compact storage.

Science News Letter, June 28, 1947

❁ **PAIL COVER**, to keep contents either hot or cold, is a bag of glass fiber and a plastic, and has a braided draw string

to gather in the upper edges. A removable lid of the same material fits the top of the pail. The cover is designed for a 10-quart galvanized pail.

Science News Letter, June 28, 1947

❁ **FIRE EXTINGUISHER**, developed for aircraft cabin use but usable elsewhere for fires in upholstery and bedding, contains an anti-freeze water solution powered by carbon dioxide and works like the well-known seltzer bottle. The gas is carried compressed in a cartridge similar to those used to inflate rubber life rafts.

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Question Box

AERONAUTICS

What is the main cause of plane crashes? p. 406.

ASTRONOMY

What constellations can you see in the summer sky? p. 407.

BIOLOGY

What metal do diatoms collect? p. 408.

CHEMISTRY

How are the chemical fragments of artificial proteins linked up? p. 403.
On what does rubber depend for its elasticity? p. 409.

What is to blame if shaving cream hardens in the tube? p. 404.

MEDICINE

How does mustard gas differ from lewisite in its effect on the skin? p. 411.

How is a new drug better for surface infections than penicillin? p. 402.

ORNITHOLOGY

Do starlings prefer waltzes or marches? p. 410.

PHYSICS

How are scientists developing plans for a rocket superior to the V-2? p. 405.

Pictures: Cover, U. S. Navy; Harvard University, p. 408; Solar Aircraft Co., p. 405; Wright Aeronautical Corp., p. 406.

Where published sources are used they are cited.

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